

Claims

We claim:

1. A recombinant protein comprising:
  - (a) a first protein, or an analog, fragment or derivative thereof; and
  - (b) a target protein of interest.
2. The recombinant protein of claim 1, further comprising:
  - (c) a linker between (a) and (b).
3. The recombinant protein of claim 2, wherein (c) comprises at least 2 amino acids.
4. The recombinant protein of claim 1, wherein (b) is any amino acid sequence of at least 20 amino acids.
5. The recombinant protein of claim 4, wherein (a) comprises an amino acid sequence of a member of the myosin or kinesin protein superfamilies, or an analog, fragment or derivative thereof.
6. The recombinant protein of claim 5, wherein (a) is chosen from the group consisting of amino acid sequences of a member of the myosin I, II, III, IV, V, VI, VIII, X or XI families, or the kinesin I or II families, or an analog, fragment derivative thereof.
7. The recombinant protein of claim 5, wherein (a) is an amino acid sequence for the motor domain of a member of the myosin or kinesin protein superfamilies, or an analog, fragment or derivative thereof.
8. The recombinant protein of claim 3, wherein (c) comprises a sequence of 3 amino acids, wherein Gly is in the second position.

9. The recombinant protein of claim 4, wherein (b) comprises the amino acid sequence of an esterase, hydrolase, phosphatase, kinase, protease, channel, structural protein, receptor, transcription factor, DNA/RNA-binding protein, lipoprotein or glycoprotein, or an analog, derivative or fragment thereof.

10. The recombinant protein of claim 9, wherein (b) is selected from the group consisting of the structural proteins coronin or spectrin, and a neuronal or immunologically relevant receptor.

11. The recombinant protein of claim 1, wherein (a) comprises an amino acid sequence of SEQ ID NO. 1.

12. The recombinant protein of claim 11, wherein (c) comprises the amino acid sequence Leu-Gly-Ser.

13. The recombinant protein of claim 1, further comprising a tag sequence at the N- or C-terminus of the protein.

14. A DNA sequence comprising an amino acid sequence that codes for the recombinant protein of claim 1.

15. An expression vector comprising the DNA sequence of claim 14.

16. An expression vector of claim 15, capable of expression in an eukaryotic host cell.

17. The expression vector of claim 16, capable of expression in cells of *Dictyostelium*.

18. A transformed eukaryotic host cell comprising a vector of claim 16.

19. A transformed eukaryotic host cell comprising a vector of claim 17.

20. A method for producing a recombinant protein according to claim 1, the method comprising the steps of:

- (a) preparing an expression vector comprising a DNA sequence that codes for the recombinant protein of claim 1;
- (b) transforming eukaryotic host cells with a vector obtainable from step (a); and
- (c) growing transformed host cells obtainable from step (b) under conditions suitable for the expression of said recombinant protein.

21. A method for purifying a recombinant protein according to claim 1, the method comprising the steps of:

- (a) preparing an expression vector comprising a DNA sequence that codes for the recombinant protein of claim 1;
- (b) transforming eukaryotic host cells with a vector obtainable from step (a);
- (c) growing transformed host cells obtainable from step (b) under conditions suitable for the overexpression of said recombinant protein;
- (d) purifying overexpressed recombinant protein by binding to endogenous actin or microtubules of the eukaryotic host cell; and
- (e) specifically releasing bound recombinant protein from the actin or microtubules.

22. The method of claim 21, wherein (e) comprises releasing the recombinant protein by adding a natural substrate of component (a) of claim 1.

23. The method according to claim 22, wherein the natural substrate is ATP.

24. The method of claim 21, further comprising at least one additional purifying step, chosen from biochemical, chromatographic and physical methods, or combinations thereof.

25. The method of claim 21, wherein the additional purification step comprises affinity chromatography.

26. The method of claim 25, wherein the affinity chromatography utilizes metals or antibodies as ligands.

27. A method for crystallizing a recombinant protein, the method comprising the steps of:

- (a) purifying the recombinant protein according to the method of claim 21; and
- (b) crystallizing the purified recombinant protein obtained in step (a).

28. A protein crystal having a crystal lattice formed by a network of recombinant proteins of claim 1.

29. A method for elucidating the atomic structure of a protein crystal, the method comprising the steps of:

- (a) crystallizing a recombinant protein according to the method of claim 27;
- (b) collecting X-ray diffraction data for the protein crystal obtained in step (a); and
- (c) calculating the atomic structure of the recombinant protein by transformation of the data obtained in step (b).